Interim Staff Guidance for Reliable Hardened Vents

Greg Krueger (Exelon)
BWROG

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Topics

Proposed input to NRC Interim Staff Guidance

Early venting concept

Next steps

Proposed ISG Elements

NRC Performance Objectives 1.1

- 1.1.1 The HCVS shall be designed to minimize the reliance on operator actions.

ISG Elements

- Minimize reliance on operator actions, however:
  - Operator involvement in initiation and termination of venting
  - Isolation of interconnected systems

Proposed ISG Elements

NRC HCVS Performance Objectives 1.1

- 1.1.2 The HCVS shall be designed to minimize plant operators' exposure to occupational hazards, such as extreme heat stress, while operating the HCVS system..

ISG Elements

- Evaluation of occupational hazards impacting venting: use of permanent and portable equipment

Proposed ISG Elements

NRC HCVS Performance Objectives 1.1

- 1.1.3 The HCVS shall also be designed to minimize radiological consequences that would impede personnel actions needed for event response.

ISG Elements

- HCVS radiological considerations (assuming no core damage) during event response

Proposed ISG Elements

NRC HCVS Design Features 1.2

- 1.2.1 The HCVS shall have the capacity to vent the steam/energy equivalent of 1 percent of licensed/ rated thermal power (unless a lower value is justified by analyses), and be able to maintain containment pressure below the primary containment design pressure.

ISG Elements

- Option 1: Vent 1% of licensed/rated thermal power
- Option 2: Vent lower value as justified by analysis

Proposed ISG Elements

NRC HCVS Design Features 1.2

- 1.2.2 The HCVS shall be accessible to plant operators and be capable of remote operation and control, or manual operation, during sustained operations.

ISG Elements

- Operation and control of HCVS by portable equipment from an accessible operating location should limit the occupational hazard
  - Applies for operator actions requiring substantial stay times

Proposed ISG Elements

NRC HCVS Design Features 1.2

- 1.2.3 The HCVS shall include a means to prevent inadvertent actuation.

ISG Elements

- No single active failure can cause inadvertent actuation
- Provide methods for preventing inadvertent actuation, such as rupture disks, pulled fuses, or keylocked switches
- Consideration of general plant design guidelines

Proposed ISG Elements

NRC HCVS Design Features 1.2

- 1.2.4 The HCVS shall include a means to monitor the status of the vent system (e.g., valve position indication) from the control room or other location(s). The monitoring system shall be designed for sustained operation during a prolonged SBO.

ISG Elements

- Sustained operation, using FLEX equipment if necessary
- Guidance on multiple parameters to be monitored

Proposed ISG Elements

NRC HCVS Design Features 1.2

- 1.2.5 The HCVS shall include a means to monitor the effluent discharge for radioactivity that may be released from operation of the HCVS. The monitoring system shall provide indication in the control room or other location(s), and shall be designed for sustained operation during a prolonged SBO.

ISG Elements

- Control room or alternative indication
- Design guidance and acceptable methods for monitoring gross radioactivity

Proposed ISG Elements

NRC HCVS Design Features 1.2

- 1.2.6 The HCVS shall include design features to minimize unintended cross flow of vented fluids within a unit and between units on the site.

ISG Elements

- Minimize use of common systems for all plants
- Allow simultaneous vent flow from multiple units if there is a common flow path for all units
- Considerations for interfacing valves
- Testing and procedural guidance

Proposed ISG Elements

NRC HCVS Design Features 1.2

- 1.2.7 The HCVS shall include features and provision for the operation, testing, inspection and maintenance adequate to ensure that reliable function and capability are maintained.

ISG Elements

- Inspection of isolation valves for interfacing systems every 3 operating cycles
- Visual inspections/walkdowns every operating cycle
- Valve cycling every other refueling cycle
- Venting procedure validation every 10 years

Proposed ISG Elements

NRC HCVS Design Features 1.2

- 1.2.8 The HCVS shall be designed for pressures that are consistent with maximum containment design pressures as well as dynamic loading resulting from system actuation.

ISG Elements

- Piping reaction loads from valve opening
- Consideration of multiple venting cycles, e.g., water hammer
- Pressure ranges up to Primary Containment Pressure Limit
- No ignition sources in vent piping

Proposed ISG Elements

NRC HCVS Design Features 1.2

- 1.2.9 The HCVS shall discharge the effluent to a release point above main plant structures.

ISG Elements

- Main plant structures include Reactor Building and Diesel Generator Building (does not have to be as high as plant stack or cooling towers)
- Release point should be situated away from HVAC intake to Control Room or Emergency Response facilities

Proposed ISG Elements

NRC HCVS Quality Standards 2

- 2.1 The HCVS vent path up to and including the second containment isolation barrier shall be designed consistent with the design basis of the plant. These items include piping, piping supports, containment isolation valves, containment isolation valve actuators and containment isolation valve position indication components.

ISG Elements

- Identical with Quality Standard 2.1

Proposed ISG Elements

NRC Quality Standards 2

- 2.2 All other HCVS components shall be designed for reliable and rugged performance that is capable of ensuring HCVS functionality following a seismic event. These items include electrical power supply, valve actuator pneumatic supply and instrumentation (local and remote) components.

ISG Elements

- Options for seismic design of HCVS might include use of Cat I criteria, industry standards (SQUG), or other engineering analyses

Proposed ISG Elements

NRC HCVS Programmatic Requirements 3

- 3.1 The Licensee shall develop, implement, and maintain procedures necessary for the safe operation of the HCVS. Procedures shall be established for system operations when normal and backup power is available, and during SBO conditions.

ISG Elements

- Procedures for system operation when normal and backup power available and during SBO conditions
- Guidance for out-of-service time and compensatory measures consistent with FLEX strategies

Proposed ISG Elements

NRC HCVS Programmatic Requirements 3

- 3.2 The Licensee shall train appropriate personnel in the use of the HCVS. The training curricula shall include system operations when normal and backup power is available, and during SBO conditions.

ISG Elements

- Training in use of installed and backup equipment consistent with Systematic Approach to Training

Early Venting Concept

Open discussion

Next Steps

BWROG submittal of proposed ISG elements expected by mid-May

August 2012 – NRC issues ISG